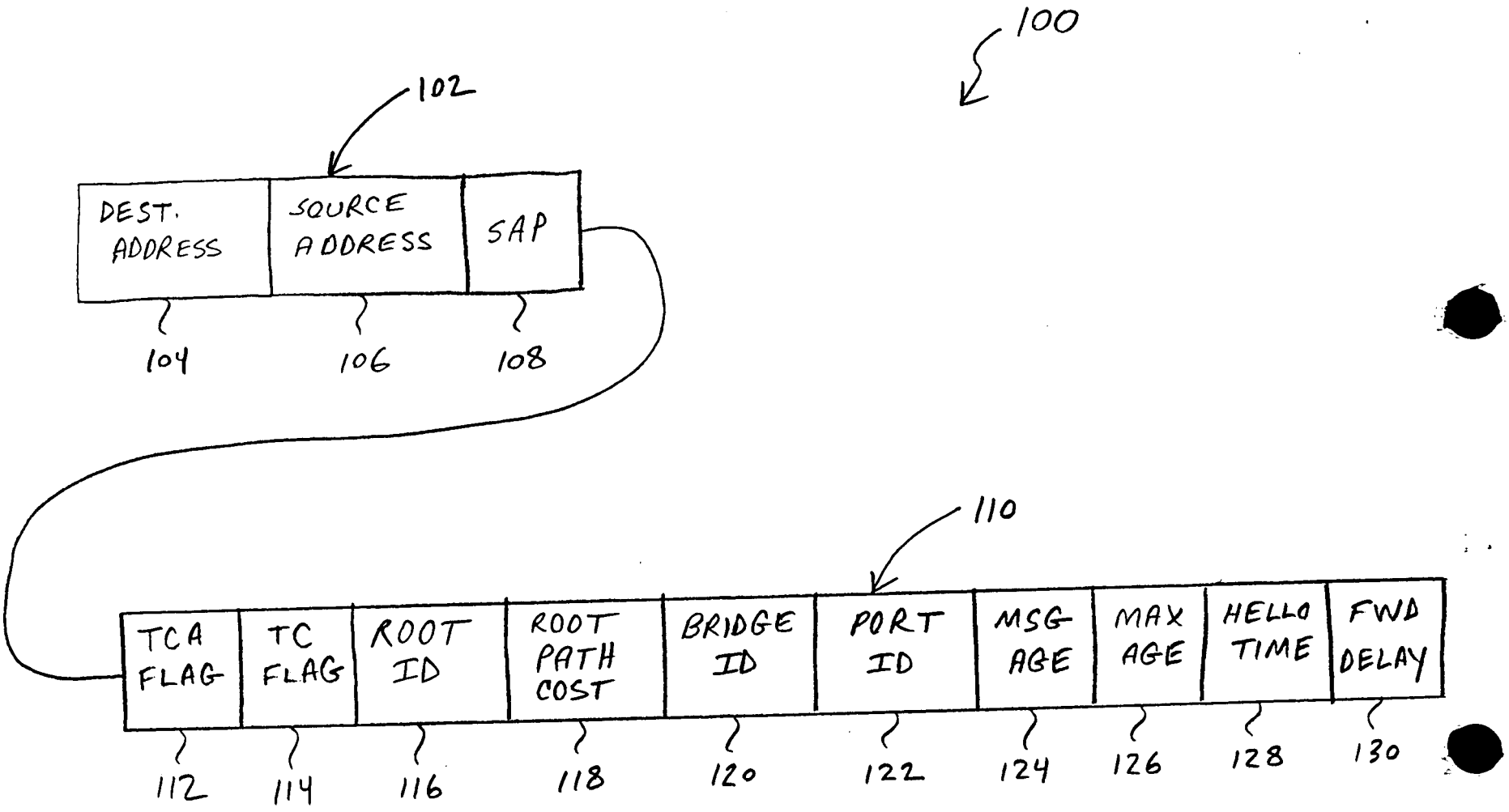

FIG. 1

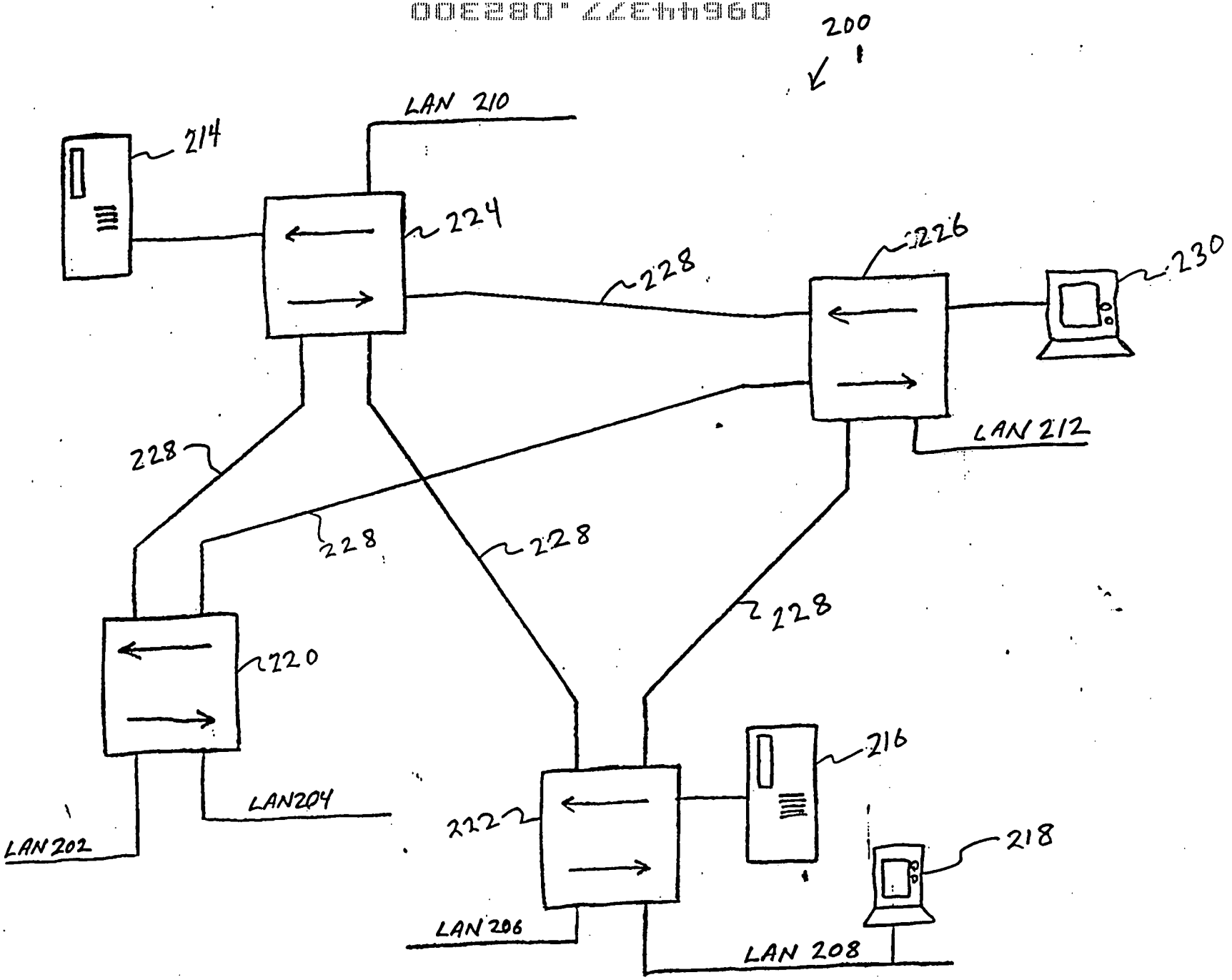

FIG. 2

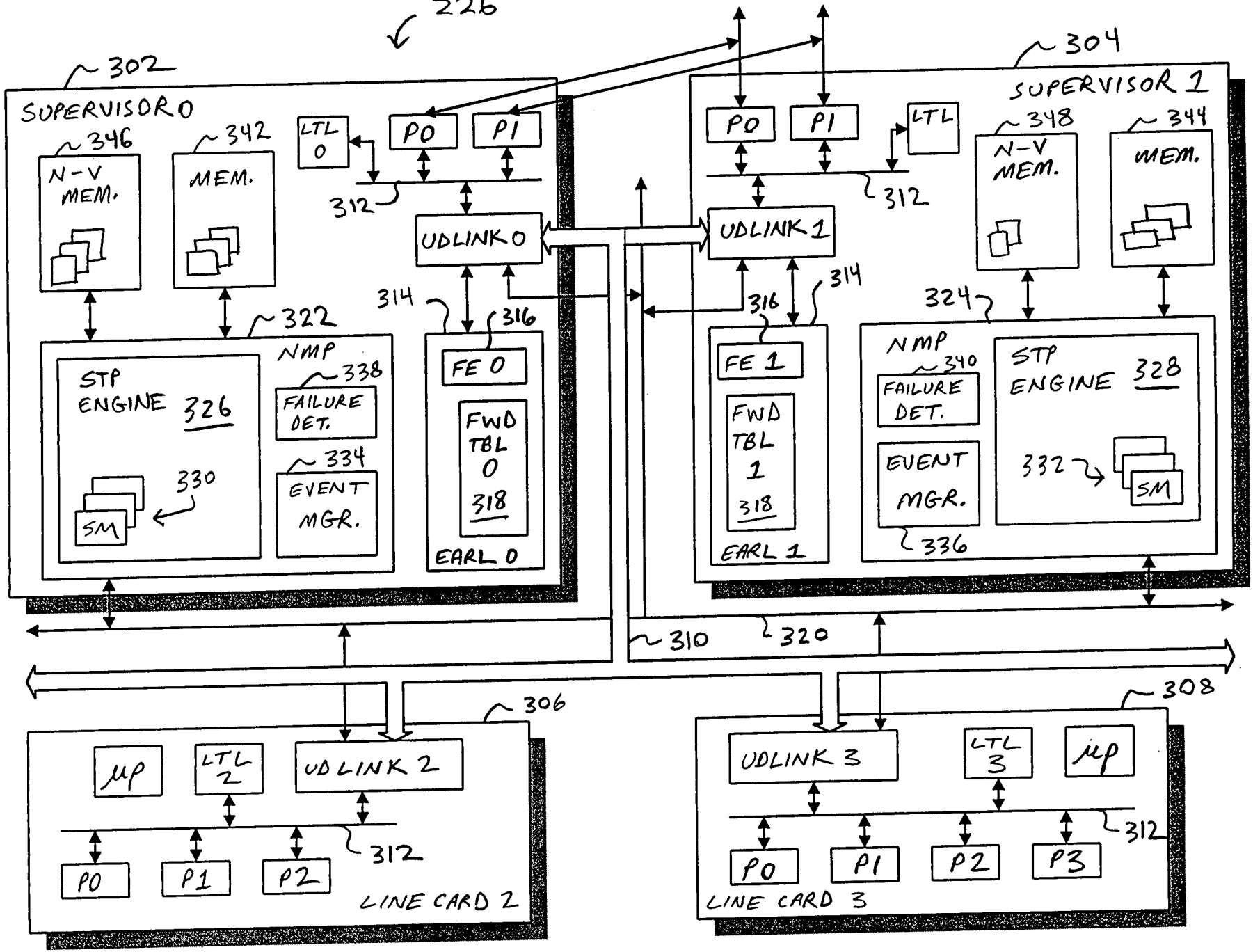

FIG. 3

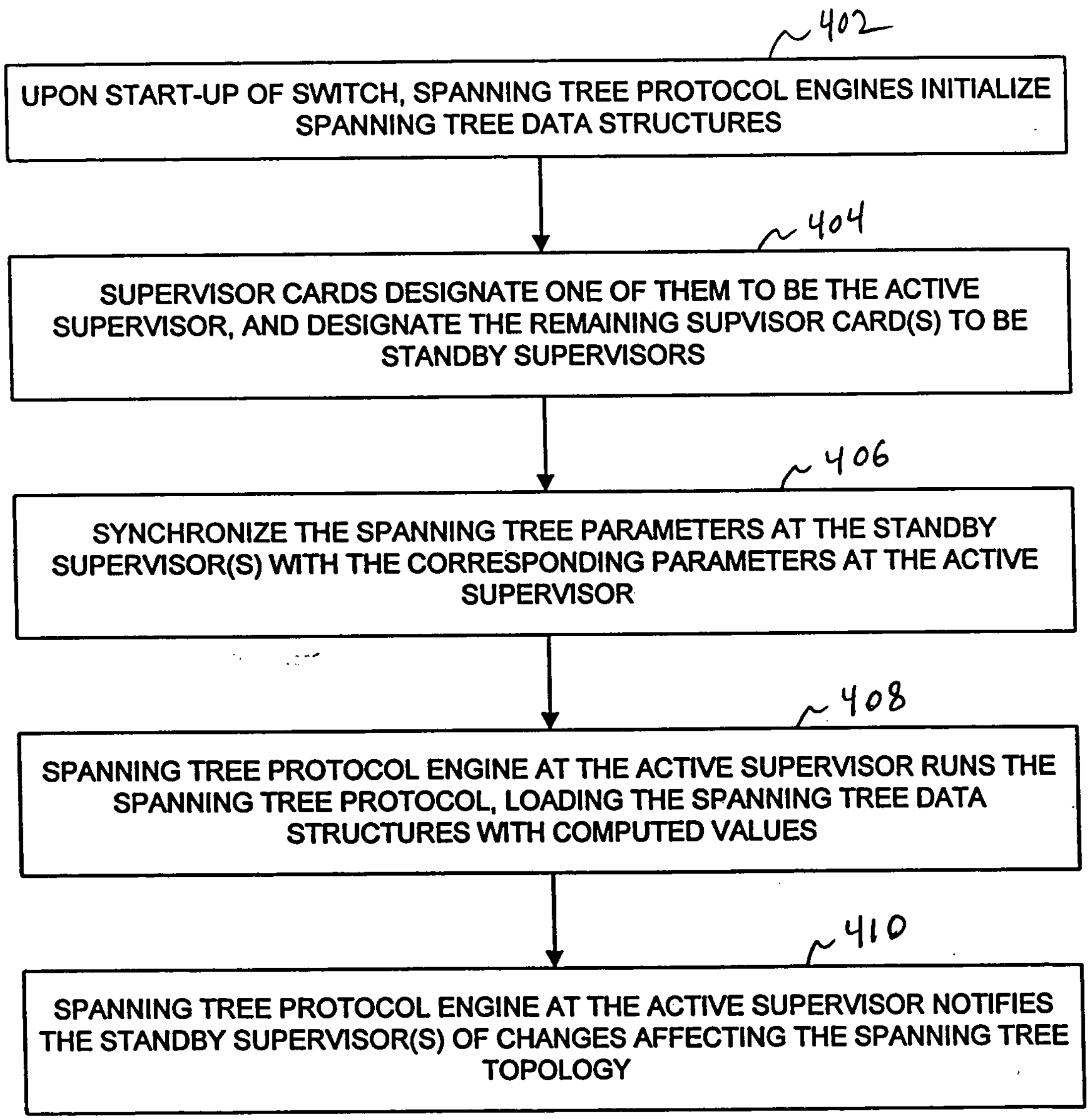
402
UPON START-UP OF SWITCH, SPANNING TREE PROTOCOL ENGINES INITIALIZE SPANNING TREE DATA STRUCTURES
404
SUPERVISOR CARDS DESIGNATE ONE OF THEM TO BE THE ACTIVE SUPERVISOR, AND DESIGNATE THE REMAINING SUPVISOR CARD(S) TO BE STANDBY SUPERVISORS
406
SYNCHRONIZE THE SPANNING TREE PARAMETERS AT THE STANDBY SUPERVISOR(S) WITH THE CORRESPONDING PARAMETERS AT THE ACTIVE SUPERVISOR
408
SPANNING TREE PROTOCOL ENGINE AT THE ACTIVE SUPERVISOR RUNS THE SPANNING TREE PROTOCOL, LOADING THE SPANNING TREE DATA STRUCTURES WITH COMPUTED VALUES
410
SPANNING TREE PROTOCOL ENGINE AT THE ACTIVE SUPERVISOR NOTIFIES THE STANDBY SUPERVISOR(S) OF CHANGES AFFECTING THE SPANNING TREE TOPOLOGY

FIG. 4

500

BRIDGE DATA STRUCTURE	
Root Bridge Identifier (ID)	502
Root Path Cost	504
Root Port	506
Maximum Age Time	508
Hello Time	510
Forward Delay Time	512
Bridge Identifier (ID)	514
Bridge Maximum Age Time	516
Bridge Hello Time	518
Bridge Forward Delay Time	520
Topology Change Detected Flag	522
Topology Change Flag	524
Topology Change Time	526
Spanning Tree Statistics	528
Port Database Array Pointer	530

FIG. 5

600

PORT DATA STRUCTURE	
Port Identifier (ID)	602
Port State	604
Designated Bridge Identifier (ID)	606
Designated Bridge Port Identifier (ID)	608
Designated Bridge Root Port Path Cost	610
Designated Root Identifier (ID)	612
Topology Change Acknowledgment	614
Configuration BPDU	616
TCN BPDU	618
Port Next State	620
Configuration BPDU in Process	622
High Availability Recovery Pending	624
Port Statistics	626
Port Data Structure Pointer	628

FIG. 6

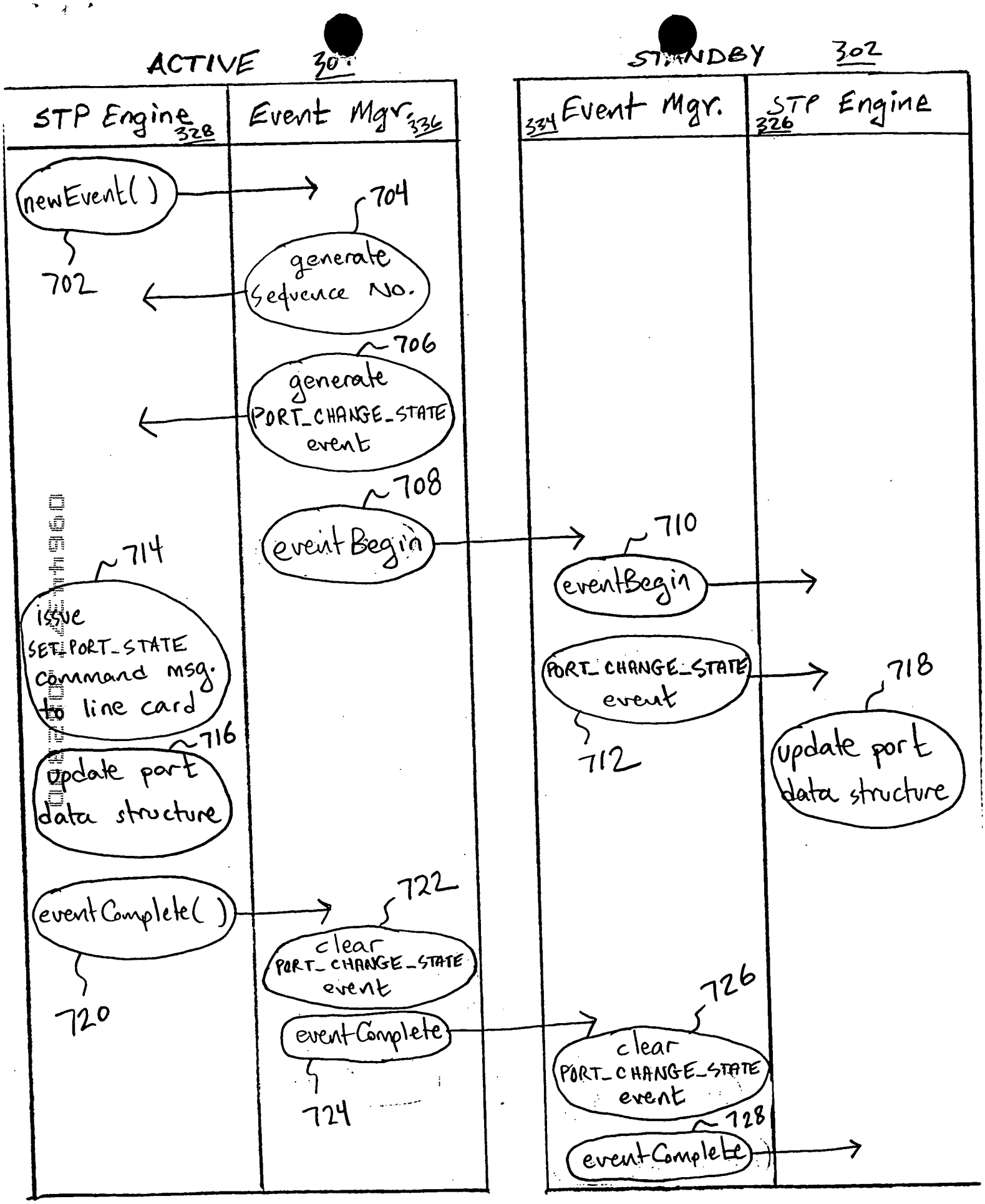
ACTIVE 304
STANDBY 302
STP Engine 328
Event Mgr. 336
334 Event Mgr.
326 STP Engine
newEvent( )
702
704
generate Sequence No.
706
generate PORT_CHANGE_STATE event
708
eventBegin
710
eventBegin
PORT_CHANGE_STATE event
712
718
update port data structure
714
issue SET_PORT_STATE command msg. to line card
716
update port data structure
eventComplete( )
720
722
clear PORT_CHANGE_STATE event
eventComplete
724
726
clear PORT_CHANGE_STATE event
728
eventComplete

FIG. 7

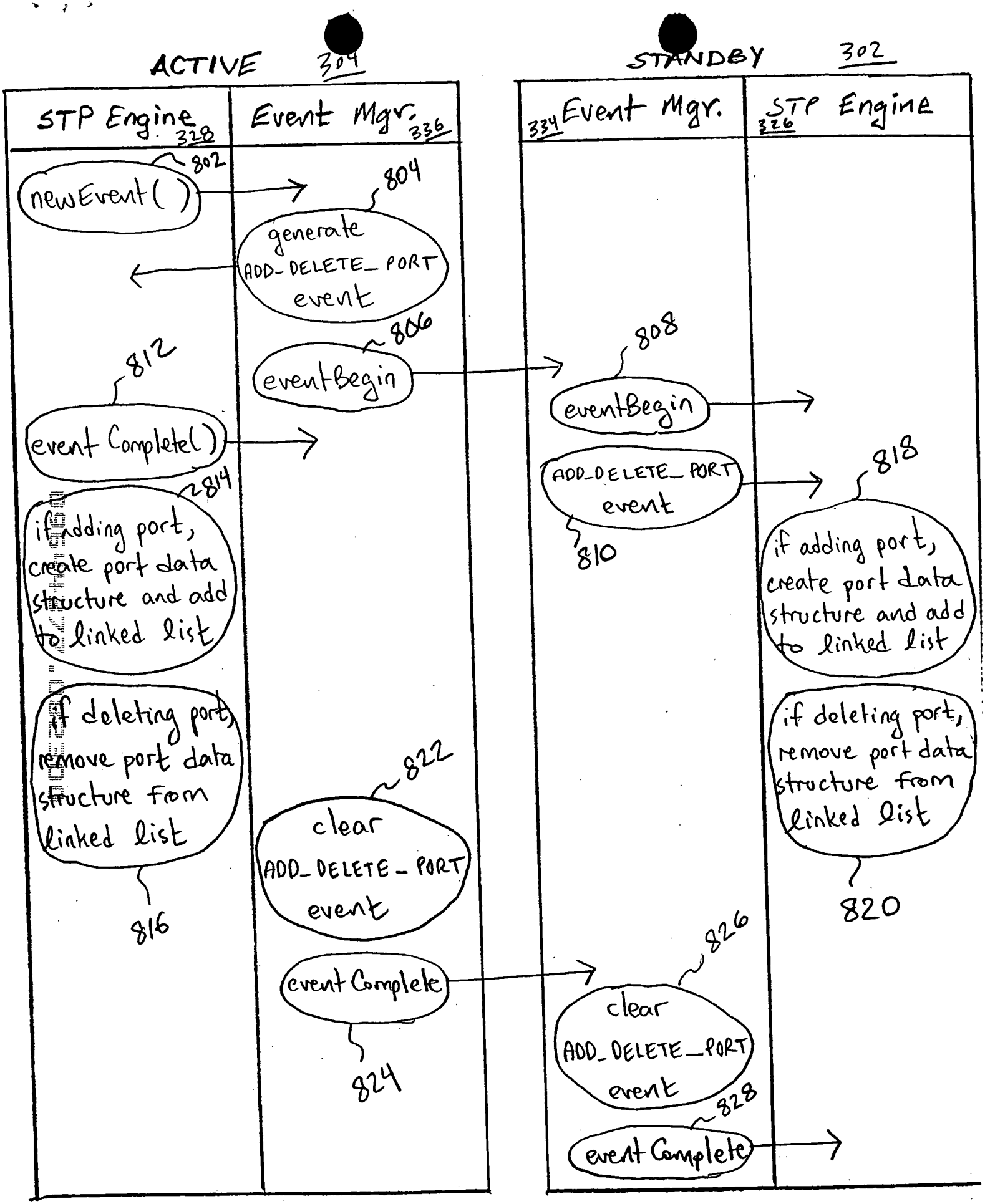
ACTIVE
304
STANDBY
302
STP Engine
328
Event Mgr.
336
334 Event Mgr.
STP Engine
326
802
newEvent( )
804
generate ADD_DELETE_PORT event
806
eventBegin
808
eventBegin
ADD_DELETE_PORT event
810
812
eventComplete( )
814
if adding port, create port data structure and add to linked list
816
if deleting port, remove port data structure from linked list
818
if adding port, create port data structure and add to linked list
820
if deleting port, remove port data structure from linked list
822
clear ADD_DELETE_PORT event
824
eventComplete
826
clear ADD_DELETE_PORT event
828
eventComplete

FIG. 8

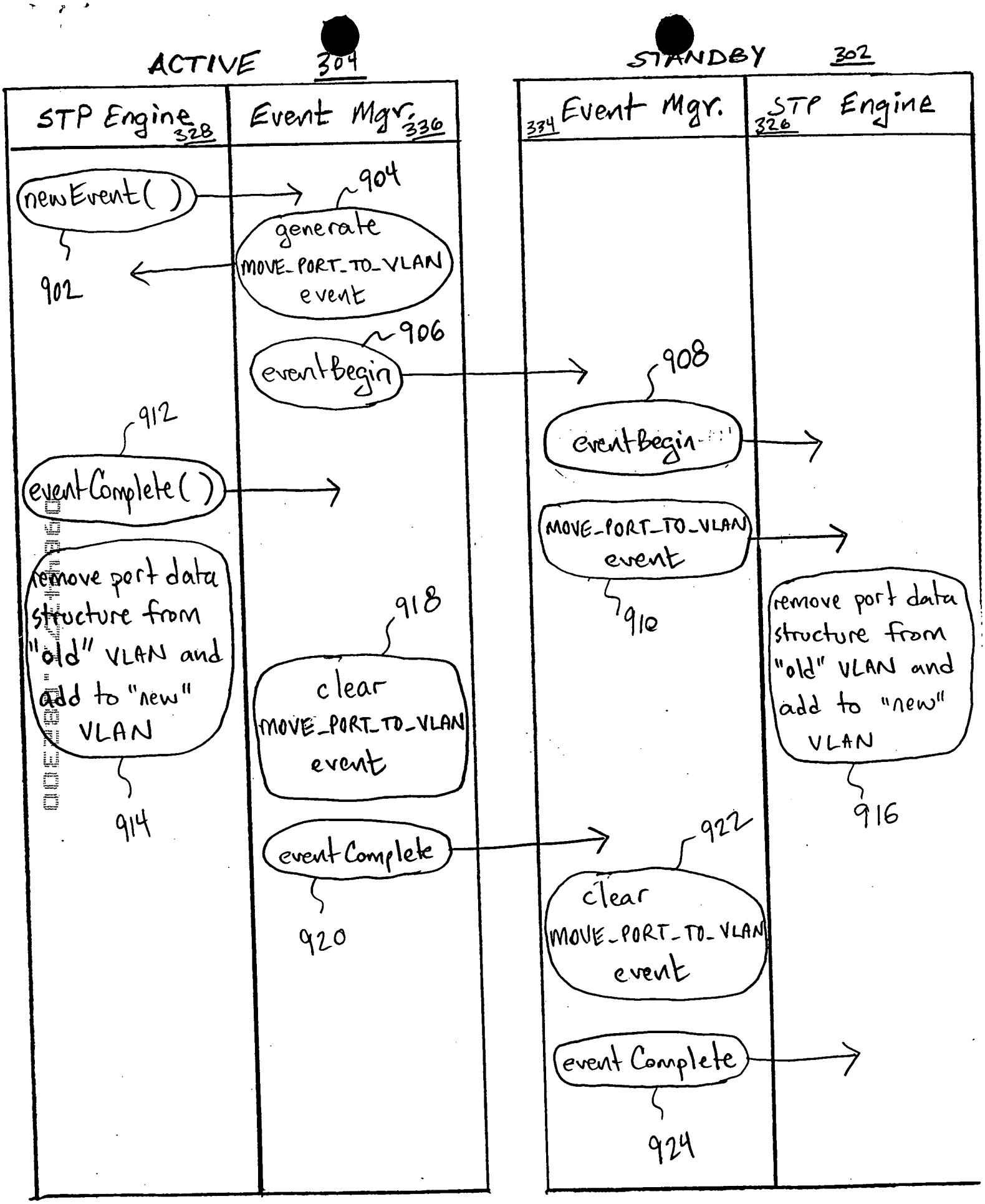
ACTIVE 304
STANDBY 302
STP Engine 328
Event Mgr. 336
334 Event Mgr.
326 STP Engine
newEvent( )
902
904
generate MOVE_PORT_TO_VLAN event
906
eventBegin
908
eventBegin
912
eventComplete( )
MOVE_PORT_TO_VLAN event
910
remove port data structure from "old" VLAN and add to "new" VLAN
914
918
clear MOVE_PORT_TO_VLAN event
remove port data structure from "old" VLAN and add to "new" VLAN
916
eventComplete
920
922
clear MOVE_PORT_TO_VLAN event
eventComplete
924

FIG. 9

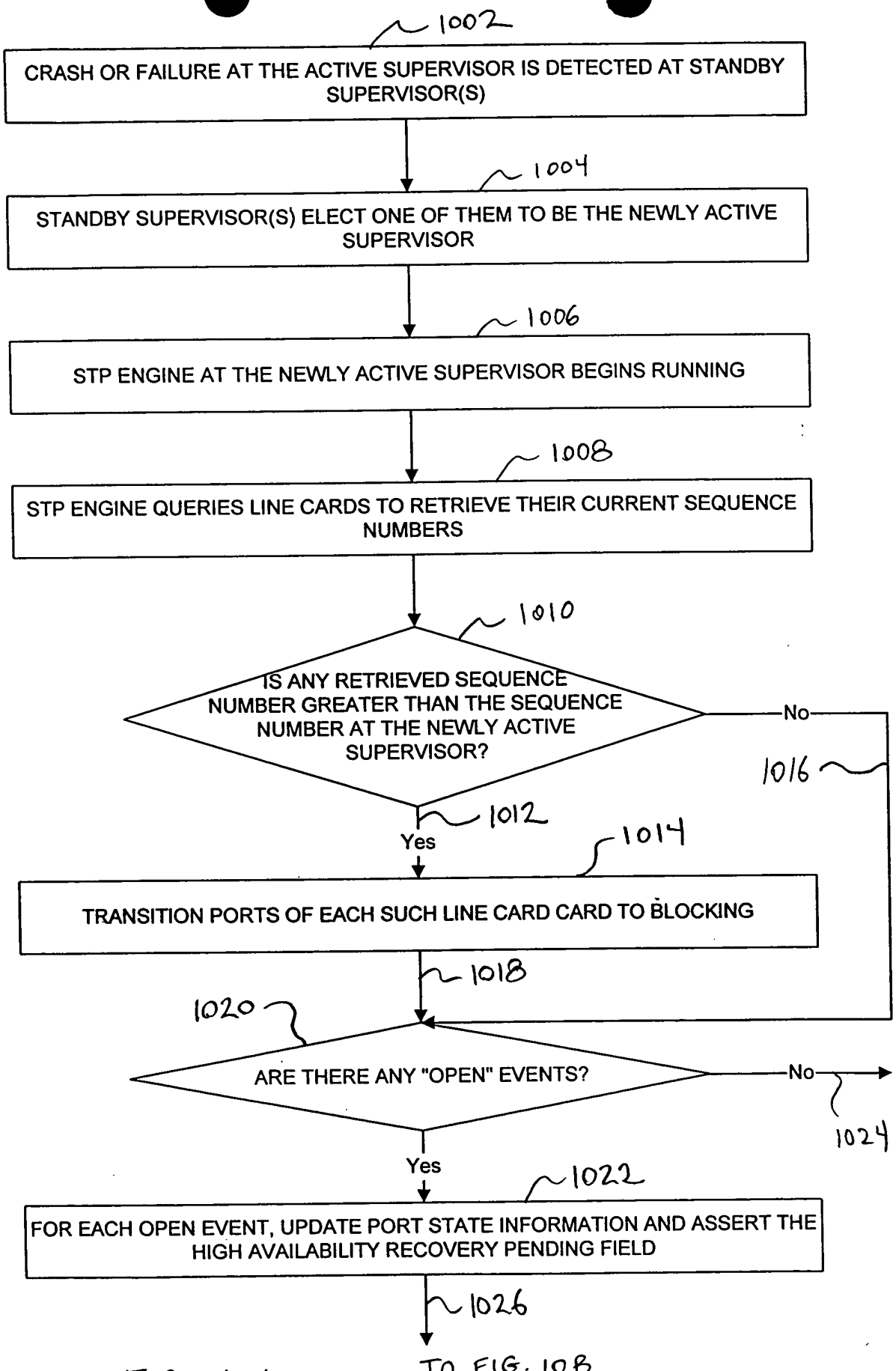
1002
CRASH OR FAILURE AT THE ACTIVE SUPERVISOR IS DETECTED AT STANDBY SUPERVISOR(S)
1004
STANDBY SUPERVISOR(S) ELECT ONE OF THEM TO BE THE NEWLY ACTIVE SUPERVISOR
1006
STP ENGINE AT THE NEWLY ACTIVE SUPERVISOR BEGINS RUNNING
1008
STP ENGINE QUERIES LINE CARDS TO RETRIEVE THEIR CURRENT SEQUENCE NUMBERS
1010
IS ANY RETRIEVED SEQUENCE NUMBER GREATER THAN THE SEQUENCE NUMBER AT THE NEWLY ACTIVE SUPERVISOR?
No
1016
1012
Yes
1014
TRANSITION PORTS OF EACH SUCH LINE CARD CARD TO BLOCKING
1018
1020
ARE THERE ANY "OPEN" EVENTS?
No
1024
Yes
1022
FOR EACH OPEN EVENT, UPDATE PORT STATE INFORMATION AND ASSERT THE HIGH AVAILABILITY RECOVERY PENDING FIELD
1026
TO FIG. 10B

FIG. 10A

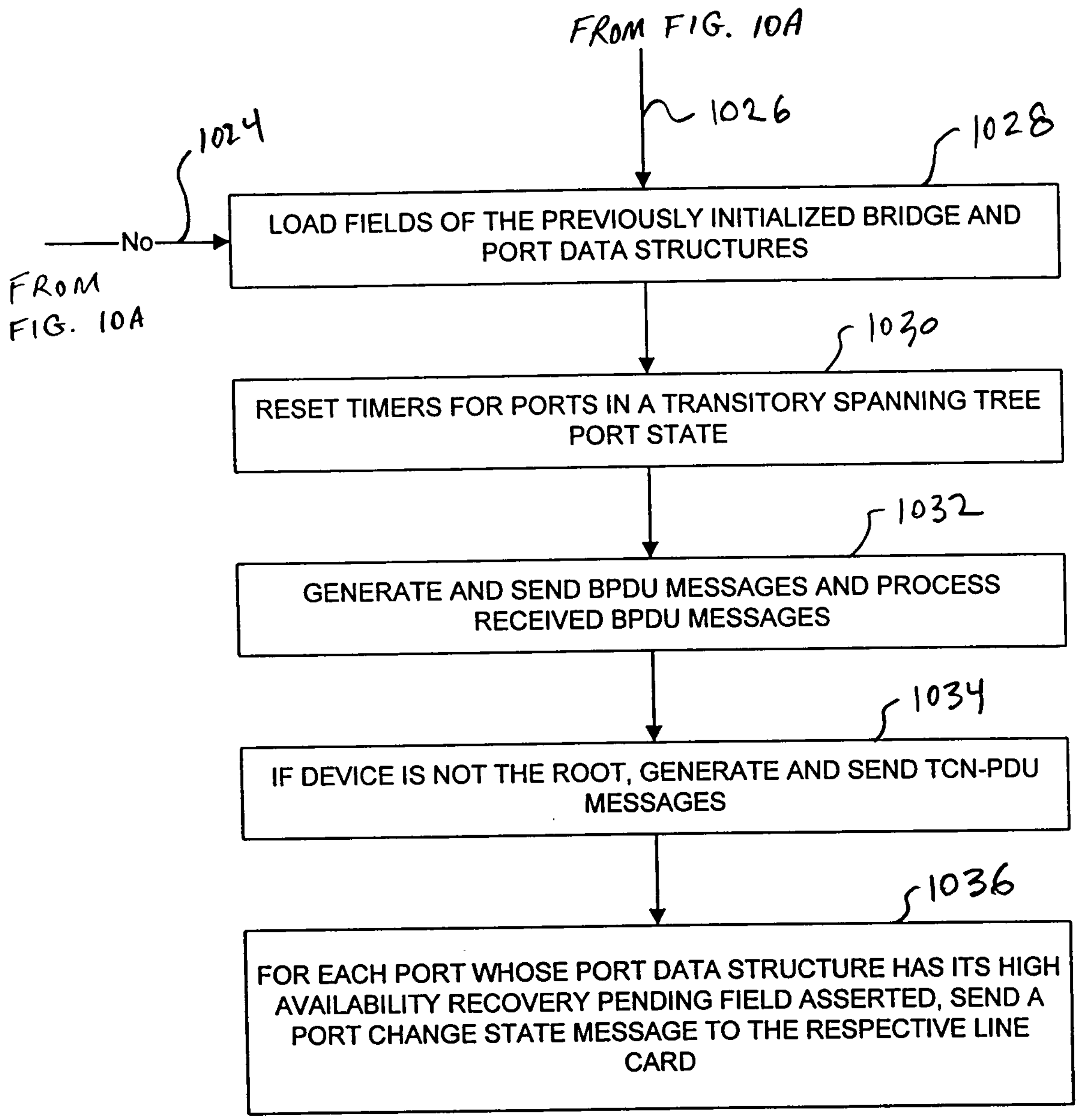
FROM FIG. 10A
1026
1024
1028
No
FROM FIG. 10A
LOAD FIELDS OF THE PREVIOUSLY INITIALIZED BRIDGE AND PORT DATA STRUCTURES
1030
RESET TIMERS FOR PORTS IN A TRANSITORY SPANNING TREE PORT STATE
1032
GENERATE AND SEND BPDU MESSAGES AND PROCESS RECEIVED BPDU MESSAGES
1034
IF DEVICE IS NOT THE ROOT, GENERATE AND SEND TCN-PDU MESSAGES
1036
FOR EACH PORT WHOSE PORT DATA STRUCTURE HAS ITS HIGH AVAILABILITY RECOVERY PENDING FIELD ASSERTED, SEND A PORT CHANGE STATE MESSAGE TO THE RESPECTIVE LINE CARD

FIG. 10B

1100

1104 1106a 1106b 1106c 1106d

PORT DATABASE ARRAY				
Module	Ports			
	P0	P1	P2	P3
Supervisor 0				
Supervisor 1				1102
Line Card 2		1102		
Line Card 3			1102	

FIG. 11